

~~42810~~
WHAT IS CLAIMED IS:

1. A heat-shrinkable multilayer film comprising:
 - (A) a first layer, which is an outer layer, and which comprises polyolefin;
 - (B) a second layer comprising at least one member selected from the group consisting of polyolefin, polystyrene, and polyurethane, wherein the second layer has a thickness of from about 10 to 50 percent, based on a total film thickness;
 - (C) a third layer comprising a polyamide having a melting point of 160°C and below; and
 - (D) a fourth, which is an outer layer, the fourth layer comprising polyester.

10

2. The film according to Claim 1, wherein the film has a total free shrink, at 185°F, of from about 40 to 170 percent, and the film has a thickness uniformity of greater than 20 percent.

15

3. The film according to Claim 1, wherein the polyamide makes up at least 40 weight percent of the third layer.

20

4. The film according to Claim 1, wherein the fourth layer comprises a polyester having a melting point of from about 200 to 260°C.

25

5. The film according to Claim 1, wherein the fourth layer comprises a polyester having from about 70 to 95 mole percent terephthalate mer units.

25

6. The film according to Claim 1, wherein the film has a gloss of at least 60 percent, as measured against the fourth layer by ASTM D2457.

7. The film according to Claim 1, wherein the film has a total thickness of from about 1 to 5 mils.

8. The film according to Claim 8, wherein the film has a total thickness of from about 2 to 3 mils.

9. The film according to Claim 1, wherein the film further comprises a fifth layer
5 which serves as an O₂-barrier layer and which is between the third layer and the fourth layer, the fifth layer comprising at least one member selected from the group consisting of EVOH, PVDC, polyalkylene carbonate, polyamide, and polyethylene naphthalate.

10. The film according to Claim 9, further comprising a sixth layer which
comprises polyamide having a melting point below 160°C, the sixth layer being between
the fourth layer and the fifth layer.

11. The film according to Claim 10, further comprising:
a seventh layer which is a tie layer, the seventh layer being between the second
15 layer and the third layer; and
an eighth layer which is a tie layer, the eighth layer being between the fourth layer
and the sixth layer; and

12. The film according to Claim 1, wherein the first layer comprises
20 ethylene/alpha-olefin copolymer, the second layer comprises ethylene/vinyl acetate copolymer, the third layer comprises polyamide having a melting point below 140°C, the fourth layer comprises polyethylene terephthalate; and the fifth layer comprises ethylene/vinyl alcohol copolymer.

25 13. The film according to Claim 12 wherein
the first layer comprises a blend of homogeneous ethylene/alpha-olefin copolymer
and heterogeneous ethylene/alpha-olefin copolymer; and
the third layer comprises a copolymer of caprolactam and laurylactam.

14. The heat-shrinkable multilayer film according to Claim 1, wherein the second layer is between the first layer and the third layer, the third layer is between the second layer and the fifth layer, the fifth layer is between the third layer and the fourth layer.

5 15. The heat-shrinkable film according to Claim 1, wherein, based on total film thickness, the first layer has a thickness of from about 1 to 40 percent, the second layer has a thickness of from about 10 to 40 percent, the third layer has a thickness of from about 5 to 40 percent, based on a total film thickness, the fourth layer has a thickness of from about 1 to 25 percent, and, the fifth layer has a thickness of from about 1 to 20
10 percent.

16. The heat-shrinkable film according to Claim 15 wherein, based on total film thickness, the first layer has a thickness of from about 20 to 30 percent, the second layer has a thickness of from about 10 to 25 percent, the third layer has a thickness of from
15 about 18 to 25 percent, based on a total film thickness, the fourth layer has a thickness of from about 4 to 16 percent, and, the fifth layer has a thickness of from about 5 to 15 percent.

20 17. The heat-shrinkable film according to Claim 1, wherein the film comprises a crosslinked polymer network.

18. The heat-shrinkable film according to Claim 17 wherein the second layer comprises a crosslinked network comprising ethylene/vinyl acetate copolymer.

25 19. A bag comprising a heat-shrinkable multilayer film comprising:
 (A) a first layer, which is an outer layer, and which comprises polyolefin;
 (B) a second layer comprising at least one member selected from the group consisting of polyolefin, polystyrene, and polyurethane, wherein the second layer has a thickness of from about 10 to 50 percent, based on a total film thickness;
30

(C) a third layer comprising polyamide having a melting point of 160°C and below; and

(D) a fourth layer, which is an outer layer, the fourth layer comprising polyester; and

5 wherein the bag is produced by sealing the first layer to itself, whereby the first layer is an inside bag layer and the fifth layer is an outside bag layer.

20. The bag according to Claim 19, wherein the film further comprises a fifth layer which serves as an O₂-barrier layer, the fifth layer comprising at least one member selected
10 from the group consisting of EVOH, PVDC, polyalkylene carbonate, polyamide, and polyethylene naphthalate.

21. A process for packaging a product, comprising the steps of:

(A) placing a first product into a flexible, heat-shrinkable bag, the bag having an open top, whereby a first bagged product having excess bag length results, and wherein the bag comprises a multilayer film comprising:

(1) a first layer, which is an inside bag layer, and which comprises polyolefin;

(2) a second layer comprising at least one member selected from the group consisting of polyolefin, polystyrene, and polyurethane;

(3) a third layer comprising a polyamide having a melting point of 160°C and below; and

(4) a fourth layer, which is an outside bag layer, the fourth layer comprising polyester; and

wherein the bag is produced by sealing the first layer to itself, whereby the first layer is an inside bag layer and the fourth layer is an outside bag layer;

(B) repeating the placing step with a second product and a second bag, whereby a second bagged product results;

(C) stacking at least the first and second bagged products so that the excess bag length of each of the bagged products are within a sealing distance of a means for heat-sealing;

(D) heat-sealing the inside layer of first bag to itself in the region between the open end of the first bag and the product, and the inside layer of the second bag to itself in the region between the open end of the second bag and the product, so that the first product is completely sealed within the first bag and the second product is completely sealed with the second bag, the sealing being carried out at a temperature so that the resulting packaged products can be freely separated from one another without layer delamination.

5 22. The process according to Claim 21, wherein the second layer has a thickness
10 of from about 10 to about 50%, based on the thickness of the multilayer film.

15 23. The process according to Claim 21, further comprising a fifth layer which
 serves as an O₂-barrier layer, the fifth layer comprising at least one member selected from
 the group consisting of EVOH, PVDC, polyalkylene carbonate, polyamide, and
 polyethylene naphthalate.

20 24. The process according to Claim 21, wherein the process is carried out in a
 rotary chamber vacuum machine.

25 25. The process according to Claim 21, wherein from 2 to 5 bagged products are
 stacked on top of one another during heat-sealing.

26. The process according to Claim 25, wherein 2 bagged products are stacked on
top of one another during heat-sealing.